What is claimed is:

1.   A multiplexing method of multiplexing
communication signals from communication signal
transmitting sections and transmitting a multiplexed
signal to a multiplexed signal receiving section,
comprising the steps of:

adding, to each of the communication signals,
an identification address preassigned to a predetermined
signal identifying section through which a communication
signal passes in a multiplexing system including the
communication signal transmitting section and the
multiplexed signal receiving section and outputting each
of the communication signals;

extracting the identification address from
each output signal; and

multiplexing the respective communication
signals on the basis of the extracted identification
addresses.

2.   A method according to claim 1, wherein the
communication signal is a PPP packet created for each
Internet subscriber apparatus, and the identification
address is a MAC address.

3.   A demultiplexing method of receiving a
multiplexed signal obtained by multiplexing a plurality

3   of communication signals from a multiplexed signal

4   transmitting section, demultiplexing the signal into

5   communication signals, and transmitting the

6   demultiplexed communication signal to a communication

7   signal receiving section, comprising the steps of:

8   adding, to each of the communication signals,

9   an identification address preassigned to a predetermined

10 signal identifying section through which a communication

11 signal passes in a multiplexing system including the

12 multiplexed signal transmitting section and the

13 communication signal receiving section, and outputting

14 each of the communication signals;

15   extracting the identification address from the

16 output signal; and

17   demultiplexing the multiplexed signal for each

18 of the communication signals on the basis of the

19 extracted identification address.

    4.   A method according to claim 3, wherein the

2   communication signal is a PPP packet created for each

3   Internet subscriber apparatus, and the identification

4   address is a MAC address.

    5.   A demultiplexing method of demultiplexing a

2   multiplexed signal obtained by multiplexing a plurality

3   of packet into packets, comprising the steps of:

4   extracting an IP address from each packet in

5   the received multiplexed signal; and

6   demultiplexing the multiplexed signal into PPP

7   packets on the basis of the extracted IP addresses.

6.   A multiplexing apparatus which is connected

2   to communication paths of communication signal

3   transmitting sections, multiplexes communication signals

4   from the communication paths, and transmits a

5   multiplexed signal to a multiplexed signal receiving

6   section through a multiplex communication path,

7   comprising:

8   address extracting means for extracting an

9   identification address, for each communication signal,

10 which is added to the communication signal received from

11 each of the communication paths and preassigned to a

12 predetermined signal identifying section through which

13 the communication signal passes in a multiplexing system

14 including the communication signal transmitting section

15 and the multiplexed signal receiving section; and

16   multiplexing means for multiplexing the

17 communication signals received from the respective

18 communication paths on the basis of the identification

19 addresses set for the respective communication signals

20 extracted by said address extracting means.

7.   An apparatus according to claim 6, wherein

2   the communication signal is a PPP packet created for

3   each Internet subscriber apparatus, and the

4   identification address is a MAC address.

8.   A demultiplexing apparatus which is

2   connected to a multiplexed signal transmitting section

3   through a multiplex communication path, demultiplexes a

4   multiplexed signal received from the multiplex

5   communication path, and transmits demultiplexed

6   communication signals to a communication signal

7   receiving section through communication paths for the

8   respective communication signals, comprising:

9   address extracting means, connected to the

10   multiplex communication path, for extracting an

11   identification address, for each of the communication

12   signals, which is added to each of the communication

13   signals in the multiplexed signal received from the

14   multiplex communication path and preassigned to a

15   predetermined signal identifying section through which a

16   communication signal passes in a demultiplexing section

17   including said multiplexed signal transmitting section

18   and said communication signal receiving section; and

19   demultiplexing means for demultiplexing the

20   multiplexed signal into the respective communication

21   signals on the basis of the identification addresses of

22   the respective communication signals which are extracted

23   by said address extracting means.

9.   An apparatus according to claim 8, wherein
2   the communication signal is a PPP packet created for
3   each Internet subscriber apparatus, and the
4   identification address is a MAC address.

10.   A demultiplexing apparatus which is
2   connected to a multiplex communication path through
3   which a multiplexed signal obtained by multiplexing
4   packets addressed to subscriber apparatuses is
5   transmitted, demultiplexes the multiplexed signal
6   received from the multiplex communication path, and
7   outputs each demultiplexed communication signal,
8   comprising:
9   address extracting means, connected to the
10   multiplex communication path, for extracting an IP
11   address of each packet in the multiplexed signal
12   received from the multiplex communication path; and
13   demultiplexing means for demultiplexing the
14   multiplexed signal into the respective packets on the
15   basis of the IP addresses of the respective packets
16   extracted by said address extracting means.

11.   An access network system comprising:
2   a plurality of subscriber apparatuses which
3   transmit/receive one of a signal having a MAC address
4   added to a packet and a signal having no MAC address
5   added to a packet;

6   a subscriber multiplexing/demultiplexing

7   apparatus which multiplexes packets in signals

8   transmitted from said respective subscriber apparatuses

9   on the basis of MAC addresses added to the packets or IP

10   addresses of the packets, and demultiplexes an input

11   multiplexed signal into packets on the basis of one of a

12   MAC address added to each packet and an IP address of

13   each packet; and

14   a protocol termination apparatus which

15   includes a first interface block which interfaces with a

16   backbone network, second and third interface blocks

17   which interface a multiplexed signal with said

18   subscriber multiplexing/demultiplexing apparatus,

19   switching means, and PPP processing means,

20   wherein said protocol termination apparatus

21   when a packet in a multiplexed signal received

22   from said subscriber multiplexing/demultiplexing

23   apparatus through said second interface block is a data

24   packet, said protocol termination apparatus causes said

25   switching means to switch to transfer the data packet to

26   said first interface block on the basis of one of a MAC

27   address added to the data packet and an IP address of

28   the packet, and transmits the packet to a backbone

29   network upon converting the packet into a POS signal by

30   using said first interface block, and

31   when a packet in a multiplexed signal received

32   from said subscriber multiplexing/demultiplexing

33   apparatus through said second interface block is a

34   control packet, said protocol termination apparatus

35   causes said switching means to switch to transfer the

36   control packet to said PPP processing means on the basis

37   of one of a MAC address added to the control packet and

38   an IP address of the packet, and causes said PPP

39   processing means to transmit the received control packet

40   through said third interface block and perform PPP

41   processing with said subscriber apparatus through said

42   subscriber multiplexing/demultiplexing apparatus.

      12.   A system according to claim 11, wherein the

2   packet is one of an Ethernet frame packet and an IEEE

3   802.3 frame packet, the data packet is one of a PPP data

4   packet in the Ethernet frame packet and a PPP data

5   packet in the IEEE 802.3 frame, and the control packet

6   is one of a PPP control packet in the Ethernet packet

7   and a PPP control packet in the IEEE 802.3 frame.

      13.   A system according to claim 11, wherein the

2   packet is one of a PPP packet in an Ethernet frame

3   packet and a PPP packet in an IEEE 802.3 frame packet,

4   the data packet is one of a PPP data packet in the

5   Ethernet frame packet and a PPP data packet in the IEEE

6   802.3 frame, and the control packet is one of a PPP

7   control packet in the Ethernet packet and a PPP control

8   packet in the IEEE 802.3 frame.

14.   An access network system comprising:

2   a plurality of subscriber apparatuses which

3   transmit/receive one of a signal having a MAC address

4   added to a packet and a signal having no MAC address

5   added to a packet;

6   a subscriber multiplexing/demultiplexing

7   apparatus which multiplexes packets in signals

8   transmitted from said respective subscriber apparatuses

9   on the basis of MAC addresses added to the packets or IP

10   addresses of the packets so as to output a multiplexed

11   signal as a POS signal, and demultiplexes an input POS

12   signal into packets on the basis of IP addresses of the

13   packets;

14   an interface which is connected to said

15   subscriber multiplexing/demultiplexing apparatus and

16   transmits a POS signal; and

17   a protocol termination apparatus which

18   includes a first interface block for interfacing with a

19   backbone network, second and third interface blocks

20   connected to said interface to interface a multiplexed

21   signal with said subscriber multiplexing/demultiplexing

22   apparatus, switching means, and PPP processing means,

23   wherein said protocol termination apparatus

24   when a packet in a multiplexed signal received

25   from said subscriber multiplexing/demultiplexing

26   apparatus through said second interface block is a data

27   packet, said protocol termination apparatus causes said

28   switching means to switch so as to transfer the data

29   packet to said first interface block on the basis of an

30   IP address of the data packet, and transmits the packet

31   to the backbone network upon converting the packet into

32   a POS signal by using said first interface block,

33   when a packet in a POS signal received from

34   said subscriber multiplexing/demultiplexing apparatus

35   through said second interface block is a control packet,

36   said protocol termination apparatus causes said

37   switching means to switch so as to transfer the control

38   packet to said PPP processing means on the basis of an

39   IP address of the control packet, and causes said PPP

40   processing means to transmit the received control packet

41   through said third interface block and perform first PPP

42   processing as PPP processing between said subscriber

43   apparatuses through said subscriber

44   multiplexing/demultiplexing apparatus, and

45   said protocol termination apparatus transmits

46   a control packet through said second interface block to

47   perform second PPP processing as PPP processing between

48   said protocol termination apparatus and said subscriber

49   multiplexing/demultiplexing apparatus.

15.   A system according to claim 14, wherein the

2   packet processed by said subscriber apparatus and the

3   packets multiplexed by said subscriber

4   multiplexing/demultiplexing apparatus are Ethernet frame

5   packets or IEEE 802.3 frame packets, and the packets

6   demultiplexed by said subscriber

7   multiplexing/demultiplexing apparatus and the packet

8   processed by said protocol termination apparatus are PPP

9   packets in PPP packet in PPP packets in an SDH/SONET

10   frame transmitted over a POS signal.

16.   A system according to claim 14, wherein each

2   of the packet processed by said subscriber apparatus and

3   the packets multiplexed by said subscriber

4   multiplexing/demultiplexing apparatus is a packet

5   selected from the group consisting of an Ethernet packet,

6   an IEEE 802.3 packet, and a PPP packet in the packet,

7   and Ethernet frame packets or IEEE 802.3 frame packets,

8   the packets demultiplexed by said subscriber

9   multiplexing/demultiplexing apparatus and the packet

10   processed by said protocol termination apparatus are PPP

11   packets in PPP packet in PPP packets in an SDH/SONET

12   frame transmitted over a POS signal.

17.   A multiplexing/demultiplexing apparatus

2   which is connected to each communication signal

3   transmitting section, multiplexes communication signals

4   received from said communication signal transmitting

5   sections, transmits a multiplexed signal to a

6   multiplexed signal receiving section, demultiplexes a

7   multiplexed signal received from said multiplexed signal

8   transmitting section, and transmits demultiplexed

9   communication signals to a communication signal

10 receiving section, comprising:

11   first address extracting means for extracting

12 an identification address, for each of the communication

13 signals, which is added to a communication signal

14 received from each of said communication signal

15 transmitting sections and preassigned to a predetermined

16 signal identifying section through which the

17 communication signal passes in a multiplexing system

18 including said communication signal transmitting section

19 and said multiplexed signal receiving section;

20   multiplexing means for multiplexing the

21 received communication signals on the basis of the

22 identification address of each of the communication

23 signals which is extracted by said first address

24 extracting means, and transmitting the multiplexed

25 signal to said multiplexed signal receiving section;

26   second address extracting means for extracting

27 an identification address, for each of the communication

28 signals, which is added to each of the communication

29 signals in the multiplexed signal received from said

30 multiplexed signal transmitting section and preassigned

31 to a predetermined signal identifying section through

32 which a communication signal passes in a demultiplexing

33 system including said multiplexed signal transmitting

34 section and said communication signal receiving section;

35 and

36   demultiplexing means for demultiplexing the

37 multiplexed signal into the respective communication

38 signals on the basis of the identification addresses of

39 the respective communication signals which are extracted

40 by said second address extracting means, and

41 transmitting demultiplexed communication signals to said

42 communication signal receiving section.

18. An apparatus according to claim 17, wherein

2 the communication signal is one of an Ethernet frame

3 packet and an IEEE 802.3 frame packet, and the

4 identification address supplied from said first address

5 extracting means to said multiplex means is a MAC

6 address.

19. An apparatus according to claim 17, wherein

2 the communication signal is a PPP packet in an Ethernet

3 frame packet or an IEEE 802.3 frame packet, and the

4 identification address supplied from said first address

5 extracting means to said multiplex means is a MAC

6 address.

20. A multiplexing/demultiplexing apparatus

2 including first receiving means provided for each

3 subscriber apparatus and connected to a first

4   communication path through which a packet output from

5   said subscriber apparatus is transmitted, first

6   transmitting means for transmitting a multiplexed signal

7   to a first multiplex communication path, second

8   receiving means connected to a second multiplex

9   communication path through which a POS signal obtained

10   by multiplexing packets addressed to said respective

11   subscriber apparatuses is transmitted, and second

12   transmitting means for transmitting each demultiplexed

13   packet to a corresponding second communication path,

14   comprising:

15   first address extracting means, connected to

16   said first receiving means, for extracting a MAC address

17   of each of the packets which is added to a packet

18   received by said first receiving means;

19   multiplexing means for multiplexing the

20   packets received by said respective first receiving

21   means on the basis of the MAC addresses of the

22   respective packets which are extracted by said first

23   address extracting means, and outputting the packet;

24   second address extracting means, connected to

25   said second receiving means, for extracting IP addresses

26   of the respective packets from the packets in the POS

27   signal received through said second receiving means; and

28   demultiplexing means for demultiplexing each

29   packet in the POS signal into the packets for said

30   respective subscriber apparatuses on the basis of the IP

31   addresses of the respective packets which are extracted

32   by said second address extracting means, and outputting

33   the packets to said second transmitting means.

21.   An apparatus according to claim 20, wherein

2   the packet is one of an Ethernet frame packet and an

3   IEEE 802.3 frame packet.

22.   An apparatus according to claim 20, wherein

2   the packet is one of a PPP packet in an Ethernet frame

3   packet and a PPP packet in an IEEE 802.3 frame packet.

23.   A protocol termination apparatus including a

2   first interface block which converts a data packet into

3   a POS signal and transmits the signal to a backbone

4   network, a second interface block which is connected to

5   a subscriber multiplexing/demultiplexing apparatus to

6   which a subscriber apparatus is connected, and receives

7   a transmitted multiplexed signal obtained by causing

8   said subscriber multiplexing/demultiplexing apparatus to

9   multiplexed signals which serve to transmit packets

10   created for the respective subscriber apparatuses and

11   are received from the subscriber apparatuses, and a

12   third interface block connected to said subscriber

13   multiplexing/demultiplexing apparatus, comprising:

14   said second interface block which extracts the

15   packet and the MAC address added to the packet or an IP

16   address of the packet from the multiplexed signal;

17   PPP processing means which is connected to

18   said subscriber multiplexing/demultiplexing apparatus

19   through said third interface block and performs PPP

20   processing between the subscriber apparatuses through

21   said subscriber multiplexing/demultiplexing apparatus;

22   and

23   switching means for, when a packet extracted

24   by said second interface block is a data packet,

25   transferring the data packet to said first interface

26   block on the basis of the MAC address or the IP address

27   of the packet which is extracted by said second

28   interface block, and when a packet extracted by said

29   second interface block is a control packet, transferring

30   the control packet to said PPP processing means on the

31   basis of one of the MAC address and the IP address of

32   the packet which are extracted by said second interface

33   block.

24.   An apparatus according to claim 23, wherein

2   the packet is one of an Ethernet frame packet and an

3   IEEE 802.3 frame packet.

25.   An apparatus according to claim 23, wherein

2   the packet is one of a PPP packet in an Ethernet frame

3   packet and a PPP packet in an IEEE 802.3 frame packet.

26.   A protocol termination apparatus including a
first interface block which converts a packet into a POS
signal and transmits the signal to a backbone network, a
second interface block which is connected, through an
interface, to a subscriber multiplexing/demultiplexing
apparatus to which a subscriber apparatus is connected,
and receives a transmitted multiplexed signal obtained
by causing said subscriber multiplexing/demultiplexing
apparatus, which has received signals, from the
respective subscriber apparatuses, which are used to
transmit packets created by the respective subscriber
apparatuses, to multiplex the packets, and a third
interface block connected to said subscriber
multiplexing/demultiplexing apparatus, said interface
being a interface which transmits a POS signal,
comprising:

said second interface block which extracts a
packet in the POS signal and an IP address of the
packet;

PPP processing means, connected to said
subscriber multiplexing/demultiplexing apparatus through
said third interface block, for transmitting a control
packet through said third interface block to perform
first PPP processing as PPP processing between the
subscriber apparatuses through said subscriber
multiplexing/demultiplexing apparatus, and transmitting
the control packet through said third interface block to

28 perform second PPP processing as PPP processing with

29 said subscriber multiplexing/demultiplexing apparatus;

30 and

31   switching means for, when a packet extracted

32 by said second interface block is a data packet,

33 transferring the data packet to said first interface

34 block on the basis of the IP address extracted by said

35 second interface block, and when a packet extracted by

36 said second interface block is a control packet,

37 transferring the control packet to said PPP processing

38 means on the basis of the IP address extracted by said

39 second interface block.

27.   An apparatus according to claim 26, wherein

2 the packet is a PPP packet in a PPP packet in PPP packet

3 in an SDH/SONET frame transmitted over an POS signal.